

# PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventors: WOLFGANG GOTZ and HELMUT GUNTHER

972,992



972,992

Date of Application and filing Complete Specification March 10, 1961.

No. 8931/61.

Complete Specification Published Oct. 21, 1964.

© Crown Copyright 1964.

Index at acceptance:—H5 R(10, 14)

International Classification: —H 05 g

## COMPLETE SPECIFICATION

### Improvements in and relating to Crystal Holders for X-ray Monochromators

We, VEB CARL ZEISS JENA, a Body Corporate, incorporated under the laws of Eastern Germany, of Carl-Zeiss-Strasse, Jena, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In X-ray spectroscopy use is frequently made of bent crystals for forming in the regular way an image of the entrance slit or the focus of the X-ray tube on the receiver. As compared to plane crystals, bent crystals help considerably towards increasing the luminosity and definition of the spectral lines, but it is rather difficult to bend and mount the crystals or crystal plates, which are comparatively thin and thus prone to suffer deformations grossly impairing the results of measurements.

All the known bending and holding devices have more or less pronounced functional shortcomings. For instance, in one of these devices, steel springs disposed on a common support press the crystal plate on either of its longitudinal margins against a curved bearing surface. However, despite symmetrical arrangement of the springs, the partial pressures cause strains in the crystal which distort the images of the spectral lines and, accordingly, impair the accuracy of measurements.

Another known bending and holding device is a block of plastic material whose bounding surfaces next to the crystal plate is the negative to the bearing surface. This block presses against all parts of the crystal plate and accordingly also against the places where the bearing surface is interrupted to give the X-rays free access. The resulting deformations of the crystal may easily cause

the ends of the focal lines to disperse considerably, which is particularly disadvantageous if a plurality of materials are to be examined for instance as to purity at the same time and in one measuring process.

The present invention aims at overcoming the foregoing disadvantages and to this end consists in a crystal holder for X-ray monochromators, comprising a curved bearing surface, and one or more flexible strips extending in the direction of the curvature of the bearing surface, and connected at the ends to the body of the bearing surface, the strips being adapted directly to hold the crystal against the bearing surface.

The one ends of said strips may be fast with the said body and the other ends of said strips may be detachably connected to the said body.

In many of the known holding devices it is not feasible to obtain the maximum visual adjustment of the X-ray illumination of the crystal surface because this surface is covered in the rear by the holding device. This disadvantage can be overcome according to a further feature of the present invention by providing two strips which in their effective position lie only above the bearing surface. To ensure reliable bend and hold of the crystal plate while preventing any damage to its margins, the ends of the strips are conveniently approximately parallel to the ends of the bearing surface. The detachable ends of the strips can be connected to each other by a pivotally mounted rod on a fulcrumed tensioning device linked to the body. Moreover, by suitable construction of this device it is possible to compensate for potential small differences in the bending forces that act on the two halves of the crystal plate.

The accompanying drawing illustrates

[Price 4s. 6d.]

45

50

55

60

65

70

75

80

BEST AVAILABLE COPY

schematically and by way of example one embodiment of the invention, Figures 1, 2 and 3 representing a plan view, an elevation and a side elevation, respectively.

5 The legs 11 and 12 of a body 13 of U-shaped cross-section have at their free ends bearing surfaces 14 and 15, respectively, both of which are parts of one and the same cylindrical surface. These bearing surfaces 14 and 15 are the supports of an asymmetrically cut crystal plate 16, the position of which is exactly defined by a mount 17. The space 18 intervening between the legs 11 and 12 of the body 13 is for unobstructed X-ray passage. The crystal plate 16 is bent and held directly in position against the bearing surface, two flexible steel strips 19 and 20. The one ends of these strips 19 and 20 are clamped by means of reinforcing plates 21 and 22, respectively, and screw 23 to the body 13. The other ends of the strips 19 and 20 are connected by means of reinforcing plates 24 and 25, respectively, and screws 26 to a rod 27. This rod 27 is pivotable about a pin 29 fast in a rod 28 arranged parallel to the cylinder generatrix. The rod 28 connects the legs of a tensioning device 30 which corresponds to the U-shape of the body 13 and whose legs have recesses 31 and 32, respectively, for holding the device 30 on a fulcrum formed by knife edges 33, 34 fast with the body 13 and constituting the axis of tilt of said device. The part connecting the legs of the device 30 has an attachment 35 which can be influenced by a screw 36 extending into the body 13.

20 Tilting the lower part of the tensioning device 30 to the body 13 strains the steel strips 19, 20. The crystal plate 16 which is placed on the bearing surfaces 14, 15 and whose one edge touches the mount 17 is accordingly so bent and held in position that

25

30

35

its entire length lies against the bearing surface. In this position, the tensioning device 30 is held by the screw 36. Loosening this screw 36 causes the strips 19, 20 to relax, so that the crystal plate 16 can be removed or exchanged for another.

WHAT WE CLAIM IS:—

1. A crystal holder for X-ray monochromators, comprising a curved bearing surface, and one or more flexible strips extending in the direction of the curvature of the bearing surface and connected at the ends to the body of the bearing surface, the strips being adapted directly to hold the crystal against the bearing surface.

2. A crystal holder according to claim 1, wherein one ends of said strips are fast with said body and the other ends of said strips are detachably connected to said body.

3. A crystal holder according to claim 1 or claim 2, wherein two strips are provided which in their effective position lie only above the bearing surface.

4. A crystal holder according to any one of claims 1 to 3, wherein the ends of the strips are approximately parallel to the ends of the bearing surface.

5. A crystal holder according to any one of claims 2 to 4, wherein the detachable ends of the strips are connected to each other by a pivotally mounted rod on a fulcrumed tensioning device linked to said body.

6. A crystal holder for X-ray monochromators substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

H. A. L. VENNER,  
Chartered Patent Agent,  
1, Great James Street, Bedford Row,  
London, W.C.1.  
Agent for the Applicants.

Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1964.  
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

972,992

1 SHEET

COMPARATIVE SPECIFICATION

This drawing is a reproduction of  
the Original on a reduced scale.

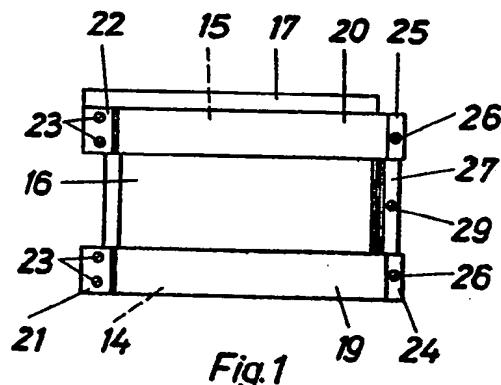


Fig. 1

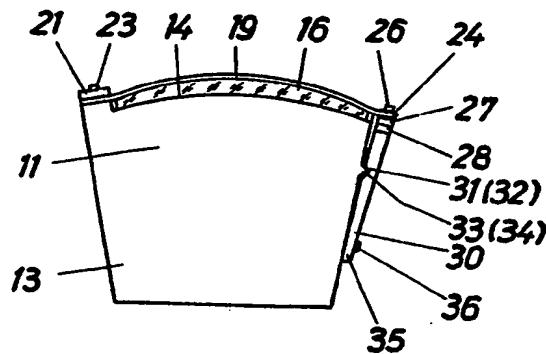


Fig. 2

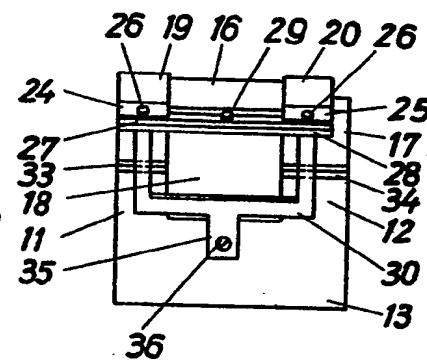


Fig. 3

BEST AVAILABLE COPY

THIS PAGE BLANK (USPTO)